CLAIMS

What is claimed is:

1. A method of forming a flip-chip semiconductor die, comprising:

providing at least one flip-chip semiconductor die having an active surface; and

forming at least one stabilizer securable to said active surface so as to protrude from said active surface, said at least one stabilizer being configured to at least partially stabilize an orientation of said at least one flip-chip semiconductor die when disposed face-down over a higher level substrate.

2. The method of claim 1, wherein said forming said at least one stabilizer comprises forming a plurality of stabilizers.

3. The method of claim 2, wherein said forming said plurality of stabilizers comprises forming at least one stabilizer of said plurality of stabilizers adjacent at least one corner of said active surface.

4. The method of claim 2, wherein said forming said plurality of stabilizers comprises forming at least two stabilizers adjacent opposite peripheral edges of said active surface.

5. The method of claim 2, wherein said forming said plurality of stabilizers comprises forming selected ones of said plurality of stabilizers to have a height that defines a substantially consistent die-to-substrate distance.

6. The method of claim 1, wherein said forming said at least one stabilizer comprises forming said at least one stabilizer from photoimageable material.

7. The method of claim 6, wherein said forming said at least one stabilizer comprises forming said at least one stabilizer as at least two superimposed, contiguous, mutually adhered layers of material.

8. The method of claim 1, wherein said providing comprises providing at least one flip-chip semiconductor die having a sealing material on an active surface thereof and wherein said forming comprises forming said at least one stabilizer to be securable to said sealing material.

9. The method of claim 1, wherein said providing comprises providing a semiconductor wafer including a plurality of flip-chip semiconductor dice.

10. The method of claim 1, further comprising adhering said at least one stabilizer to said active surface.

11. The method of claim 1, wherein said forming said at least one stabilizer comprises applying a layer of insulative material on said active surface and patterning said layer.

12. The method of claim 1, wherein said forming said at least one stabilizer comprises applying a layer of photoresist material on said active surface and patterning said layer.

13. The method of claim 1, further comprising introducing an encapsulant material between said die and said substrate.

14. The method of claim 1, wherein said forming said at least one stabilizer comprises positioning said at least one stabilizer on said active surface so as to avoid contact with conductive traces on a carrier substrate.

15. The method of claim 1, further comprising disposing at least one conductive structure on at least one bond pad of said at least one flip-chip semiconductor die.

16. The method of claim 15, wherein said disposing comprises forming a solder bump on said at least one bond pad.

17. The method of claim 15, wherein said disposing comprises applying one of a conductive pillar, a conductor filled epoxy pillar, and a structure of Z-axis elastomer to said at least one bond pad.

18. A method of fabricating a semiconductor device component, comprising:

providing at least one substrate with contact pads on an active surface thereof; and

sequentially forming on said active surface at least one stabilizer having a plurality of superimposed, contiguous, mutually adhered layers of photopolymer, said at least one stabilizer being configured to at least partially stabilize an orientation of the semiconductor device component upon being disposed face-down over a higher level substrate.

19. A method of fabricating a semiconductor device component, comprising:

placing at least one substrate having an active surface with contact pads exposed thereon in a horizontal plane;

recognizing a location and orientation of said at least one substrate;

stereolithographically forming on said active surface, between one of said contact pads and a peripheral edge of said substrate, at least one stabilizer comprising at least one layer of semi-solid material.

20. The method of claim 19, further comprising storing data including at least one physical parameter of said at least one substrate in computer memory, and using the

stored data in conjunction with a machine vision system to recognize the location and orientation of said at least one substrate and to form the at least one stabilizer thereon.

21. The method of claim 20, further including in computer memory at least one parameter of another semiconductor device component to which said at least one substrate is to be attached.

22. The method of claim 20, further comprising using the stored data, in conjunction with said machine vision system, to selectively form said at least one layer of semi-solid material stereolithographically on at least one portion of said active surface of said at least one substrate.

23. The method of claim 20, further including securing said at least one substrate to a carrier prior to placing said at least one substrate in said horizontal plane.

24. A semiconductor device component, comprising:

a substrate having an active surface with contact pads exposed thereto, said contact pads being configured to be connected with conductors on a first surface of another semiconductor device; and

at least one stabilizer protruding from said active surface and positioned between a periphery of said active surface and said contact pads.

25. The semiconductor device component of claim 24, wherein said at least one stabilizer protrudes from said active surface a distance no more than a distance that at least one conductive structure to be disposed in contact with at least one of said contact pads will extend beyond said active surface.

26. The semiconductor device component of claim 25, wherein said at least one stabilizer protrudes from said active surface a distance that permits conductive

structures on said contact pads to contact said conductors of said another semiconductor device.

27. The semiconductor device component of claim 24, wherein said stabilizer comprises a dielectric material.

28. The semiconductor device component of claim 24, wherein said stabilizer comprises a photocurable material.

29. The semiconductor device component of claim 28, wherein said stabilizer has a plurality of superimposed, contiguous, mutually adhered layers.

30. The semiconductor device component of claim 24, wherein said at least one stabilizer is positioned proximate a corner of said active surface.

31. The semiconductor device component of claim 24, wherein said at least one stabilizer has a cross-sectional plan of one of quadrilateral, round, oval, and triangular.

32. The semiconductor device component of claim 24, wherein said at least one stabilizer is elongate in a direction parallel to the active surface.

33. The semiconductor device component of claim 24, further comprising protruding conductive structures in contact with selected ones of said contact pads.

34. The semiconductor device component of claim 33, wherein said conductive structures comprise at least one of solder bumps, conductive columns, conductor-filled columns, and z-axis conductive adhesive.

35. The semiconductor device component of claim 24, wherein said substrate comprises a semiconductor wafer with a plurality of dice thereon.

36. A method for electrically bonding a flip-chip semiconductor device component having a surface and conductive structures protruding from said surface to a substrate having contacts positioned correspondingly to the conductive structures, said method comprising:

forming at least one stabilizer configured to be disposed between the surface and the substrate;

inverting and positioning the semiconductor device on the substrate to contact said conductive structures to corresponding contacts; and

bonding the conductive members to the contacts.

37. The method of claim 36, wherein said forming at least one stabilizer comprises forming at least one stabilizer to have a height less than the minimum distance the conductive structures protrude from said surface.

38. The method of claim 36, wherein said forming at least one stabilizer comprises forming said at least one stabilizer to space the surface from the substrate a distance greater than the minimum distance at least one of the conductive structures protrudes from the surface.

39. The method of claim 38, wherein said bonding comprises lengthening at least one of the conductive structures.

40. The method of claim 36, wherein said forming at least one stabilizer comprises configuring the at least one stabilizer to be positioned between a periphery of the surface of the semiconductor device component and said conductive structures.

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